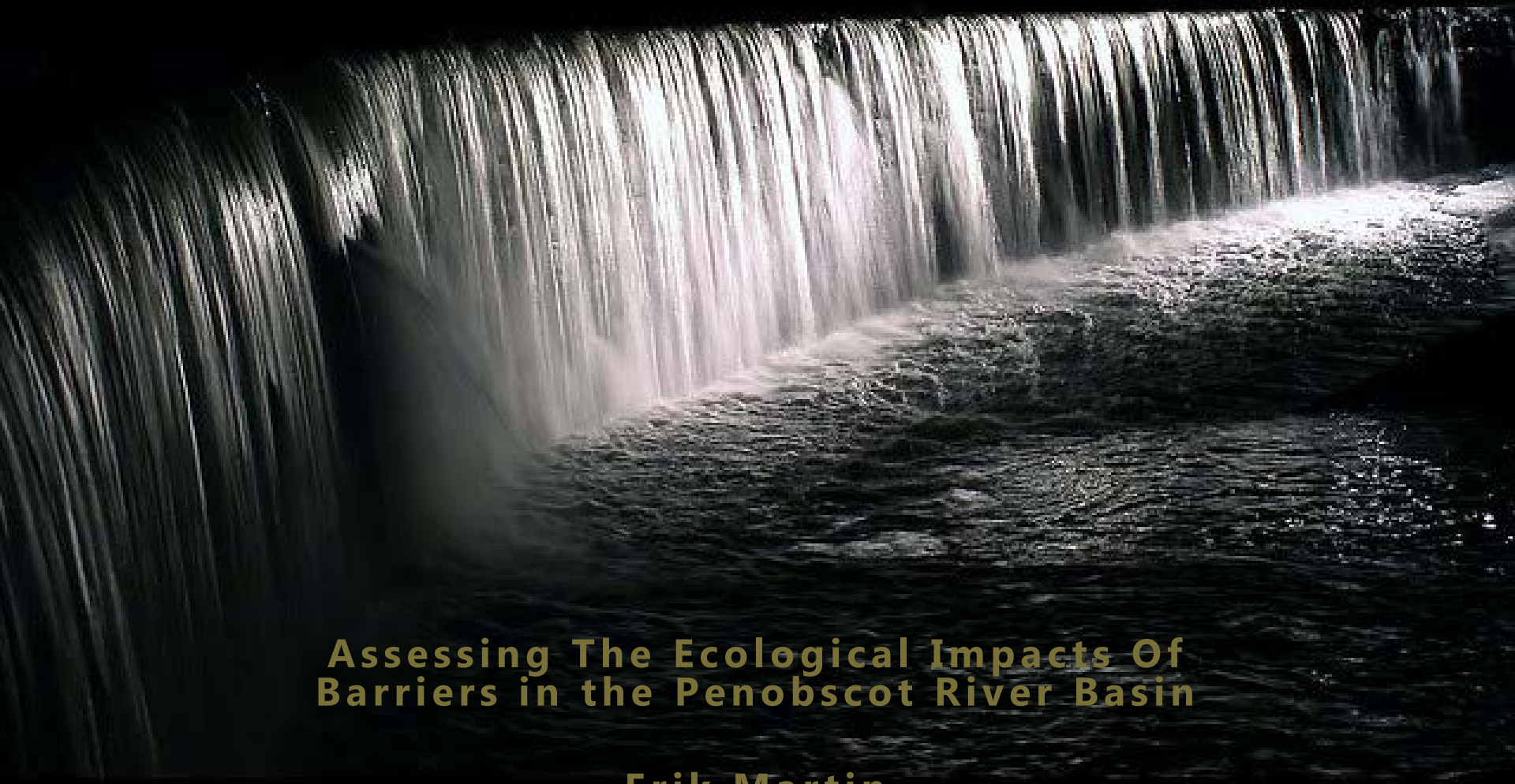
Jun 20th, 3:00 PM - 3:15 PM

Penobscot II: Penobscot Habitat Blueprint Barrier Prioritization Tool: Assessing the Ecological Impacts of Barriers in the Penobscot River Basin

Erik Martin

Penobscot Habitat Blueprint Barrier Prioritization Tool



Assessing The Ecological Impacts Of Barriers in the Penobscot River Basin

Erik Martin

Fish Passage 2016

Penobscot River Restoration

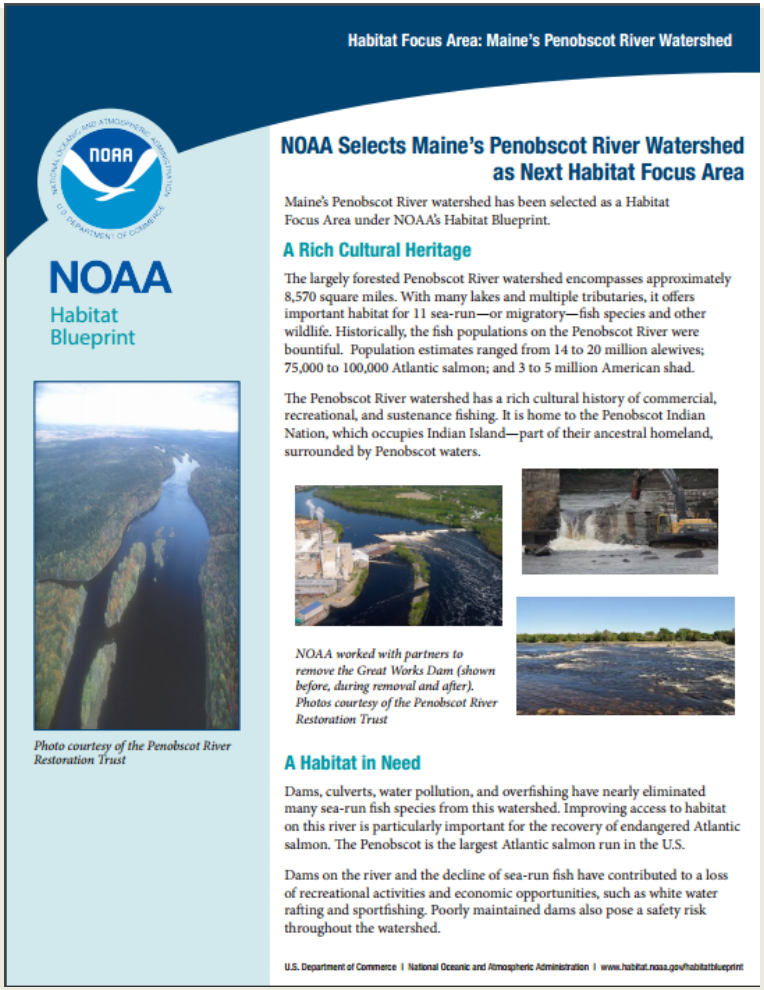
- Two dams removed
- Improved passage at two others
- Restored access to thousands* of stream miles
- Slightly more power generation

What's the next Penobscot?


©B. Beesaw/TNC

NOAA Habitat Focus Area

- Penobscot one of the first three focus areas (2014)
  - Remove dams
  - Construct fishways
  - Replacing culverts
  - Conducting pre- and post-monitoring of restoration projects
  - Identify priority areas for fish passage



Habitat Focus Area: Maine's Penobscot River Watershed

NOAA Habitat Blueprint

NOAA Selects Maine's Penobscot River Watershed as Next Habitat Focus Area

Maine's Penobscot River watershed has been selected as a Habitat Focus Area under NOAA's Habitat Blueprint.

A Rich Cultural Heritage

The largely forested Penobscot River watershed encompasses approximately 8,570 square miles. With many lakes and multiple tributaries, it offers important habitat for 11 sea-run—or migratory—fish species and other wildlife. Historically, the fish populations on the Penobscot River were bountiful. Population estimates ranged from 14 to 20 million alewives; 75,000 to 100,000 Atlantic salmon; and 3 to 5 million American shad.

The Penobscot River watershed has a rich cultural history of commercial, recreational, and sustenance fishing. It is home to the Penobscot Indian Nation, which occupies Indian Island—part of their ancestral homeland, surrounded by Penobscot waters.

Photo courtesy of the Penobscot River Restoration Trust

NOAA worked with partners to remove the Great Works Dam (shown before, during removal and after). Photos courtesy of the Penobscot River Restoration Trust

A Habitat in Need

Dams, culverts, water pollution, and overfishing have nearly eliminated many sea-run fish species from this watershed. Improving access to habitat on this river is particularly important for the recovery of endangered Atlantic salmon. The Penobscot is the largest Atlantic salmon run in the U.S.

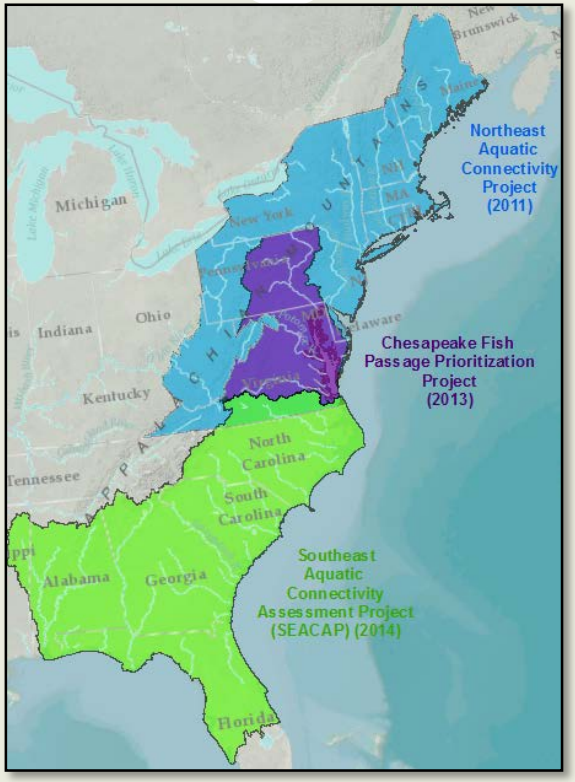
Dams on the river and the decline of sea-run fish have contributed to a loss of recreational activities and economic opportunities, such as white water rafting and sportfishing. Poorly maintained dams also pose a safety risk throughout the watershed.

U.S. Department of Commerce | National Oceanic and Atmospheric Administration | www.habitat.noaa.gov/habitatblueprint

Three Projects, Three Geographies, Common Approach for Restoring Connectivity

- All rivers & dams are unique
- Resources are scarce
- Where to work?

- 2007 Connecticut DEP:
  - Opportunistic → *"ecological-benefits"* approach - **Prioritize**



- Northeast Aquatic Connectivity
  - http://bit.ly/1Rgk9MN
- Chesapeake Fish Passage Prioritization
  - http://maps.tnc.org/EROF_ChesapeakeFPP
- Southeast Aquatic Connectivity Assessment Project (SEACAP)
  - http://maps.tnc.org/seacap

- Compiled a ***database*** of dams → calculate ecologically relevant ***metrics***
- ***Tiered result*** → potential ecological benefit if removed / improved passage
- ***Flexible tool*** → assess multiple objectives at multiple scales

Conceptual Approach

Identify dams that would provide the greatest ecological gain if removed / bypassed

- Calculated a suite of metrics for every dam & weight the relative importance of each metric

On a mainstem tributary river

2 rare mussel spp in watershed

15 miles connected river upstream

Current habitat for 3 migratory species downstream of dam

2 other dams downstream

4% impervious surface in upstream watershed

90% forest cover in upstream watershed

In a watershed with healthy brook trout populations

Not all metrics are of equal importance → Selected & weighted metrics → Developed scenarios that meet project objectives

Workgroup

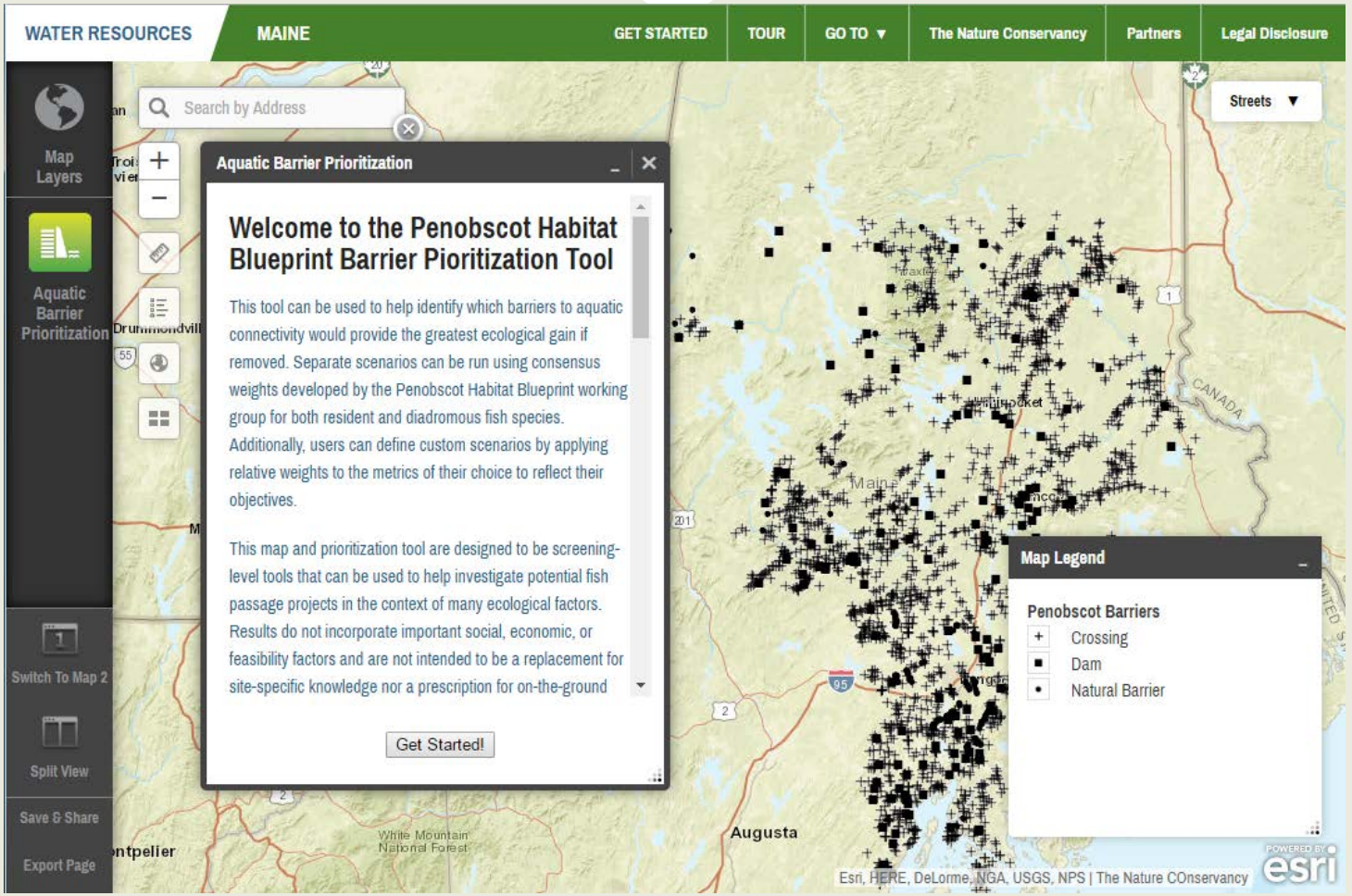
- Workgroup engagement at every step of the process
  - Data collection
  - Key decisions
    - Scenarios
    - Species
  - Result review

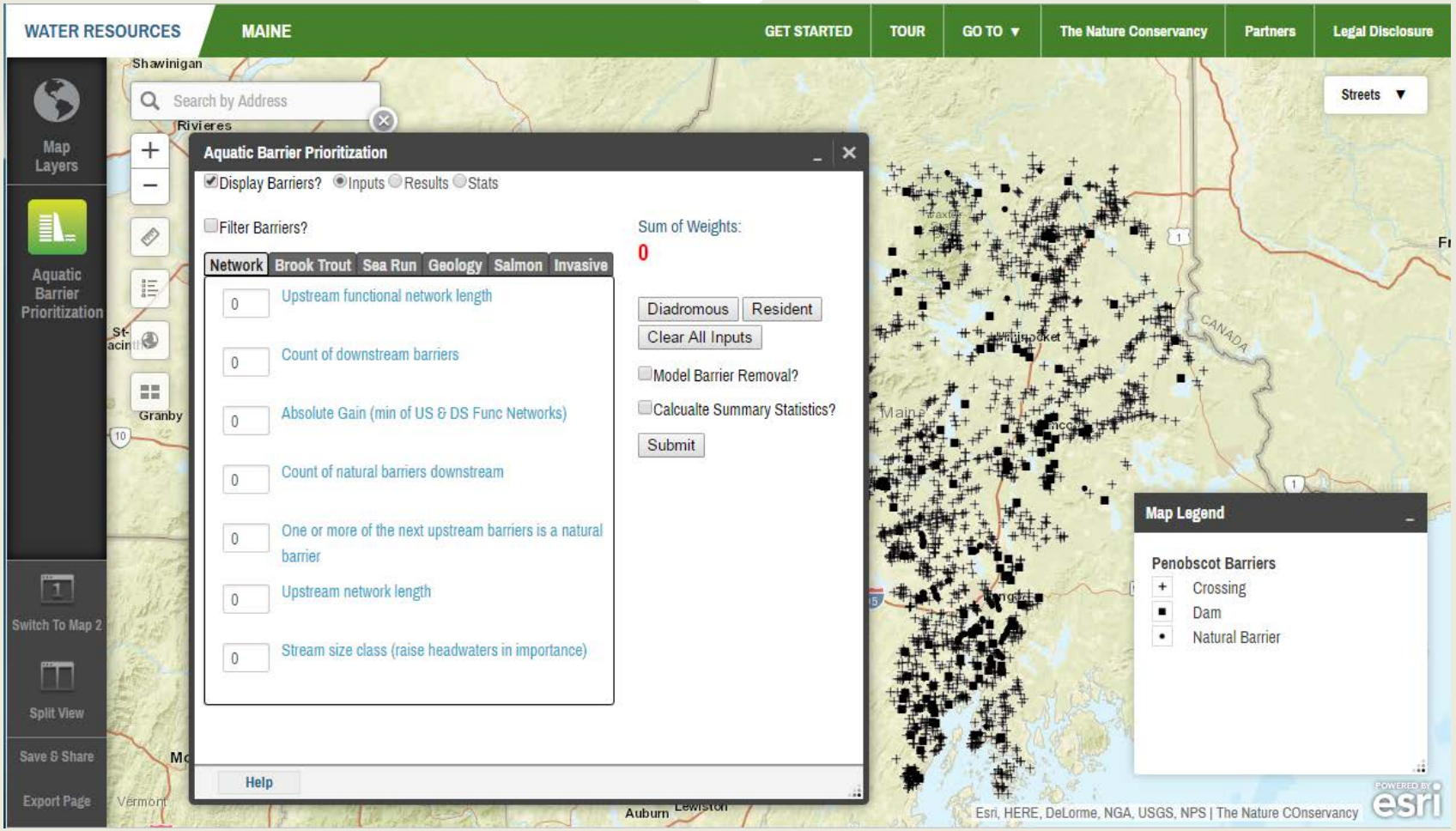
Road-Stream Crossing Data Collection

- TNC / USFWS crews conducting field surveys
- Assess passability of crossing structures
- North Atlantic Aquatic Connectivity Collaborative (NAACC) assessment protocol

Photo: USFWS

http://maps.coastalresilience.org/maine/

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GET STARTED
TOUR
GO TO
The Nature Conservancy
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Map Layers
Aquatic Barrier Prioritization
Switch To Map 2
Split View
Save & Share
Export Page
Search by Address
Streets
Aquatic Barrier Prioritization
Display Barriers?
Inputs
Results
Stats
Filter Barriers?
Sum of Weights:
0
Network
Brook Trout
Sea Run
Geology
Salmon
Invasive
Upstream functional network length
Count of downstream barriers
Absolute Gain (min of US & DS Func Networks)
Count of natural barriers downstream
One or more of the next upstream barriers is a natural barrier
Upstream network length
Stream size class (raise headwaters in importance)
Diadromous
Resident
Clear All Inputs
Model Barrier Removal?
Calcualte Summary Statistics?
Submit
Help
Map Legend
Penobscot Barriers
Crossing
Dam
Natural Barrier
Esri, HERE, DeLorme, NGA, USGS, NPS | The Nature COnservancy
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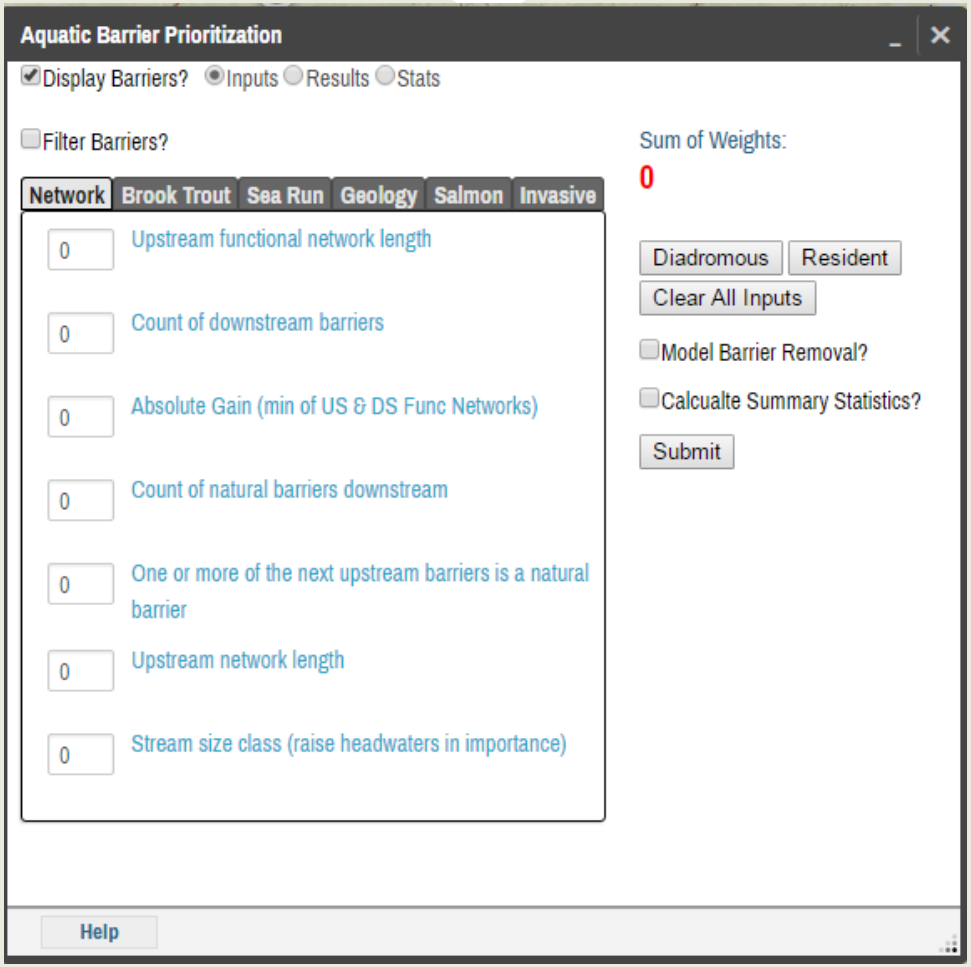
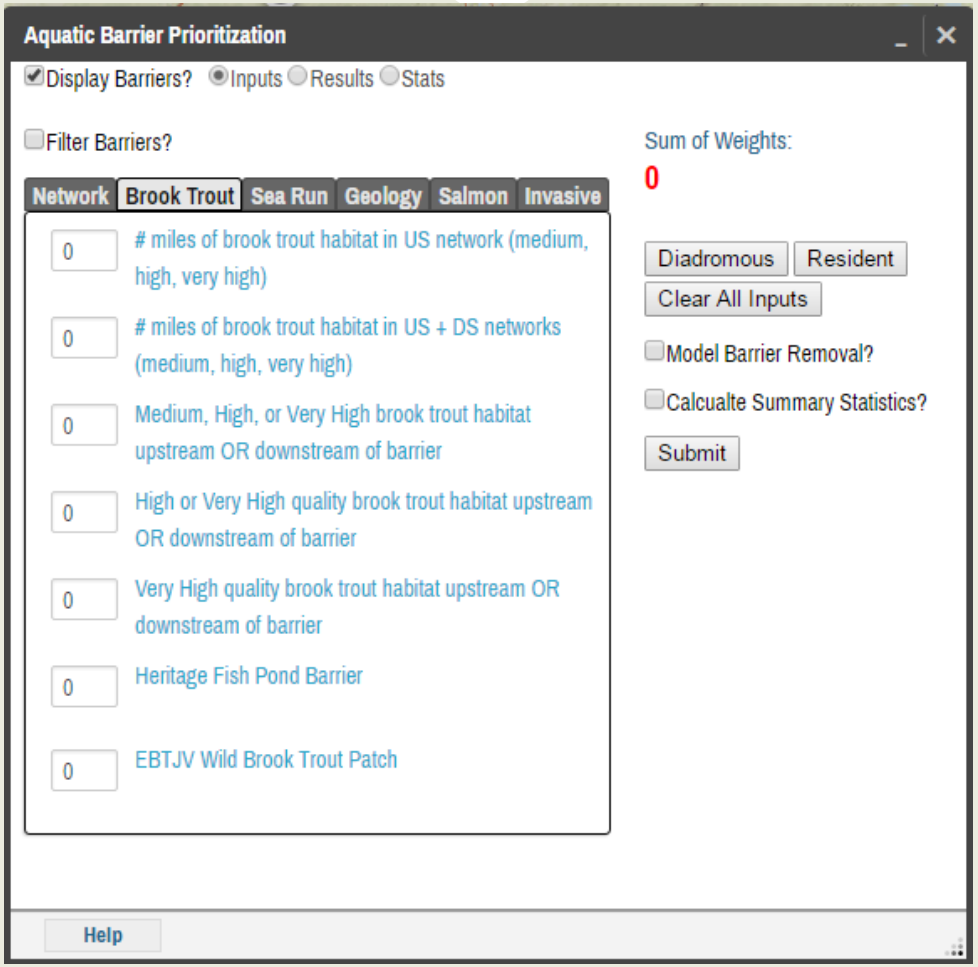
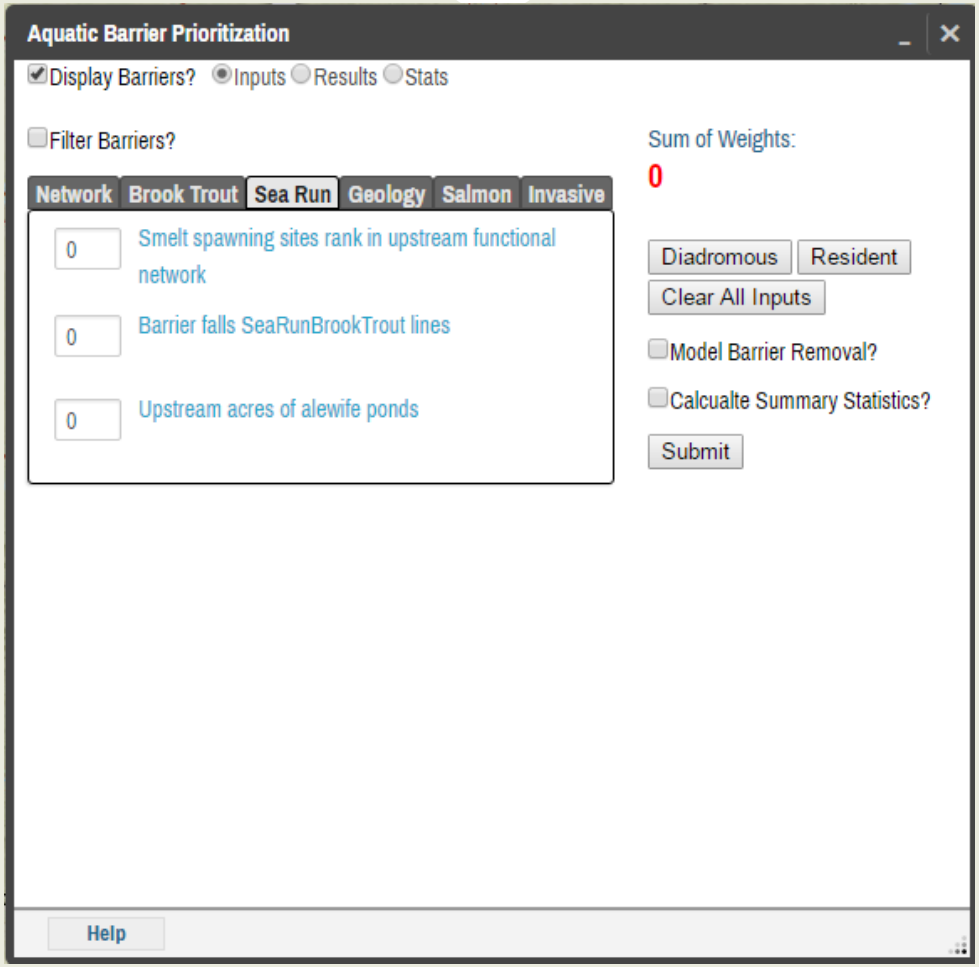
Metrics: Network



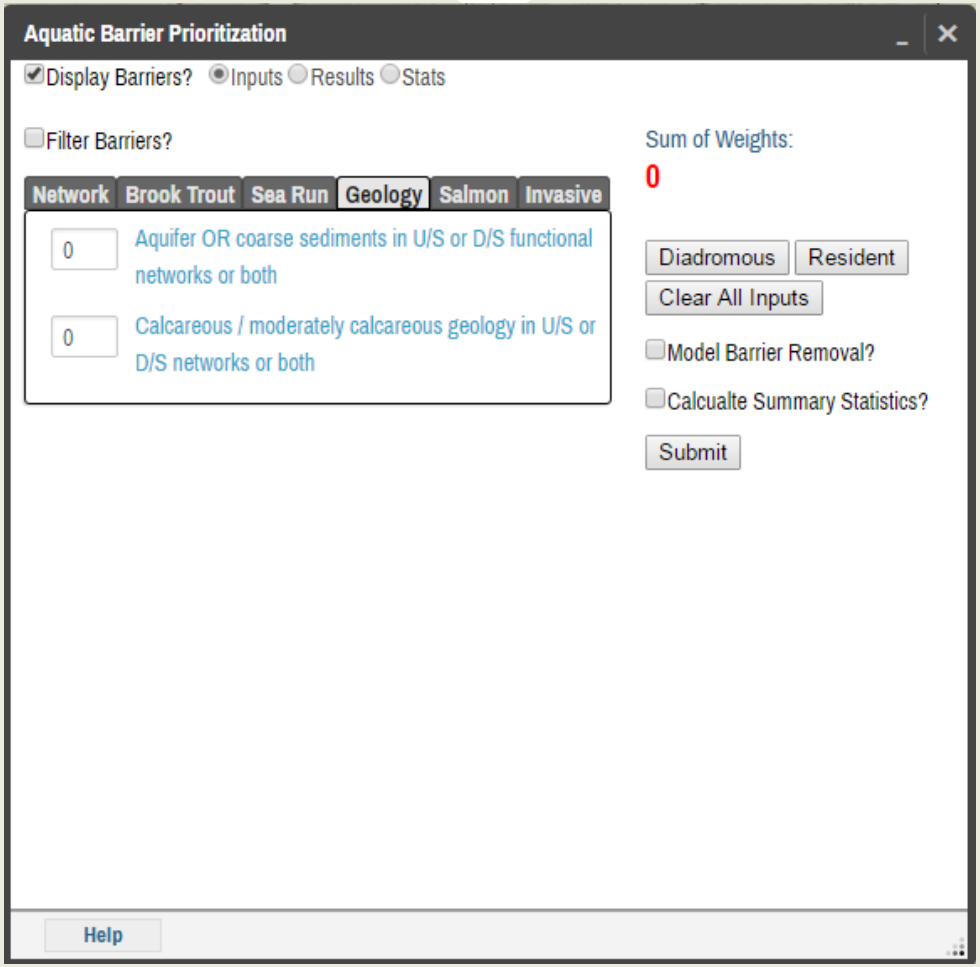
Metrics: Brook Trout



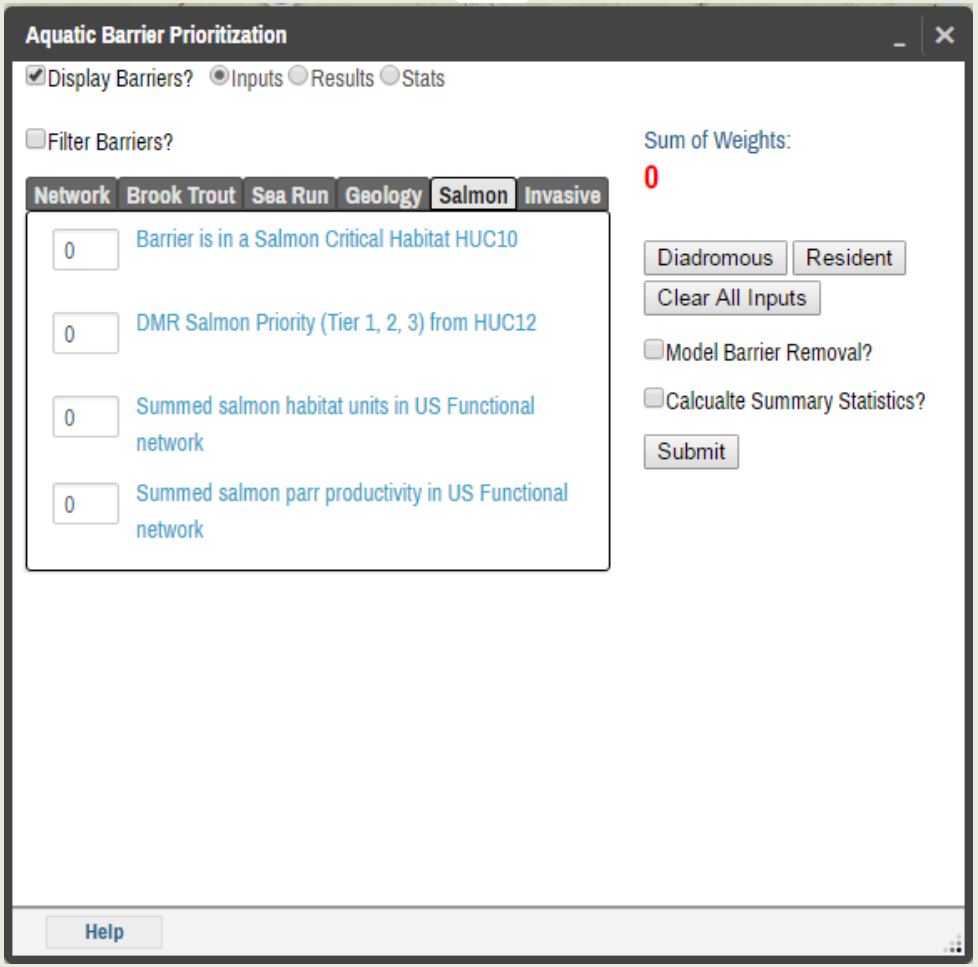
Metrics: Sea Run Fish



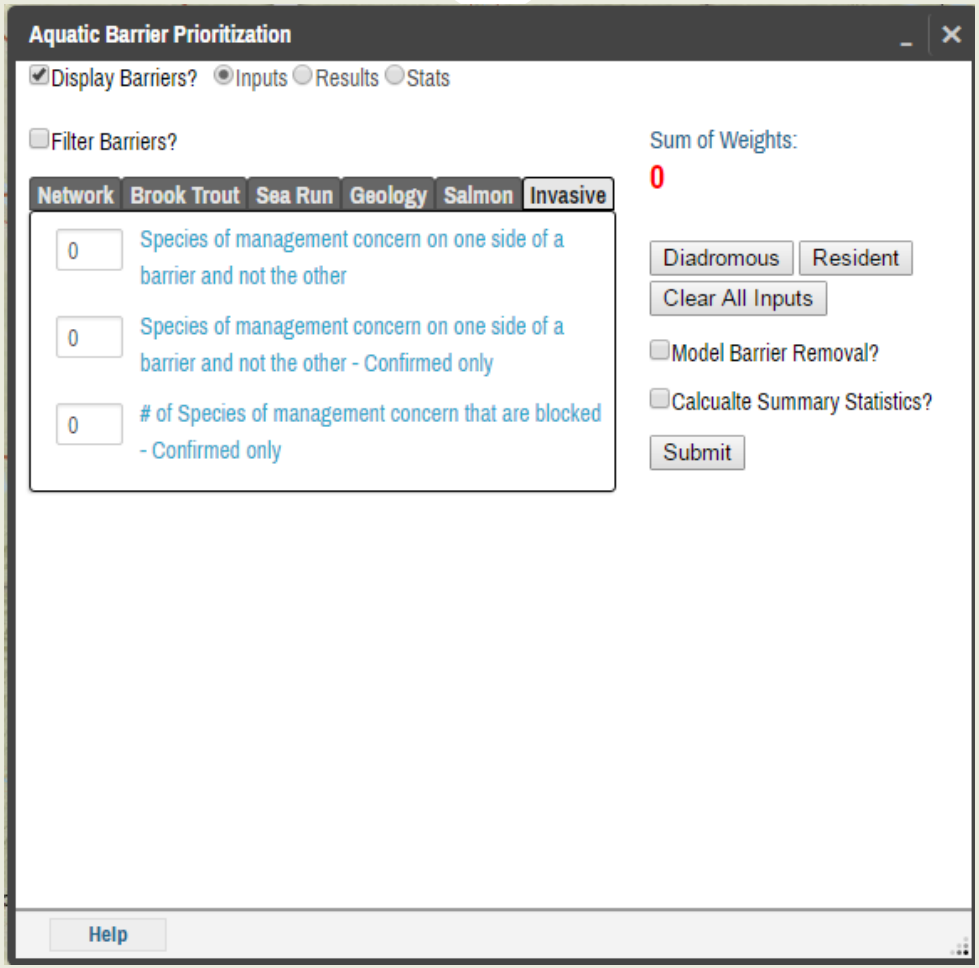
Metrics: Geology



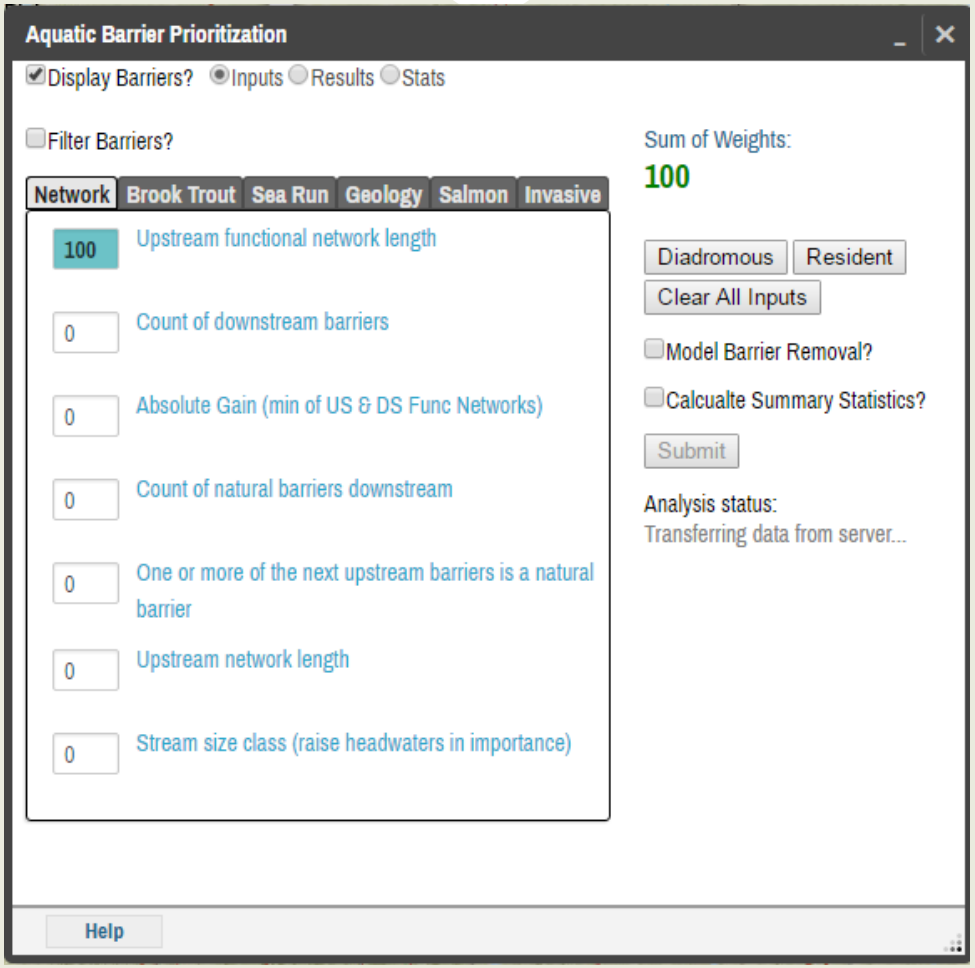
Metrics: Salmon



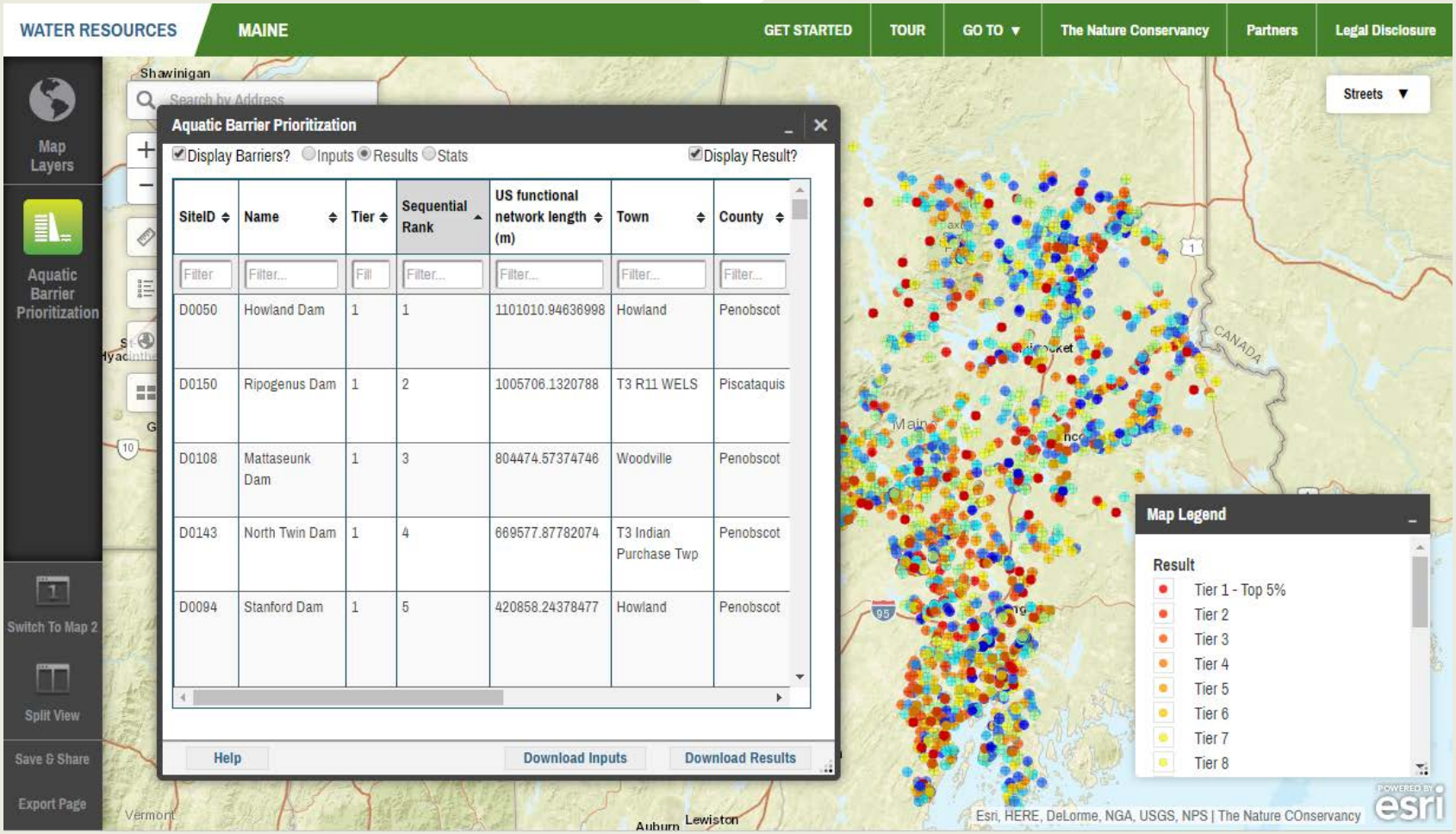
Metrics: Invasives

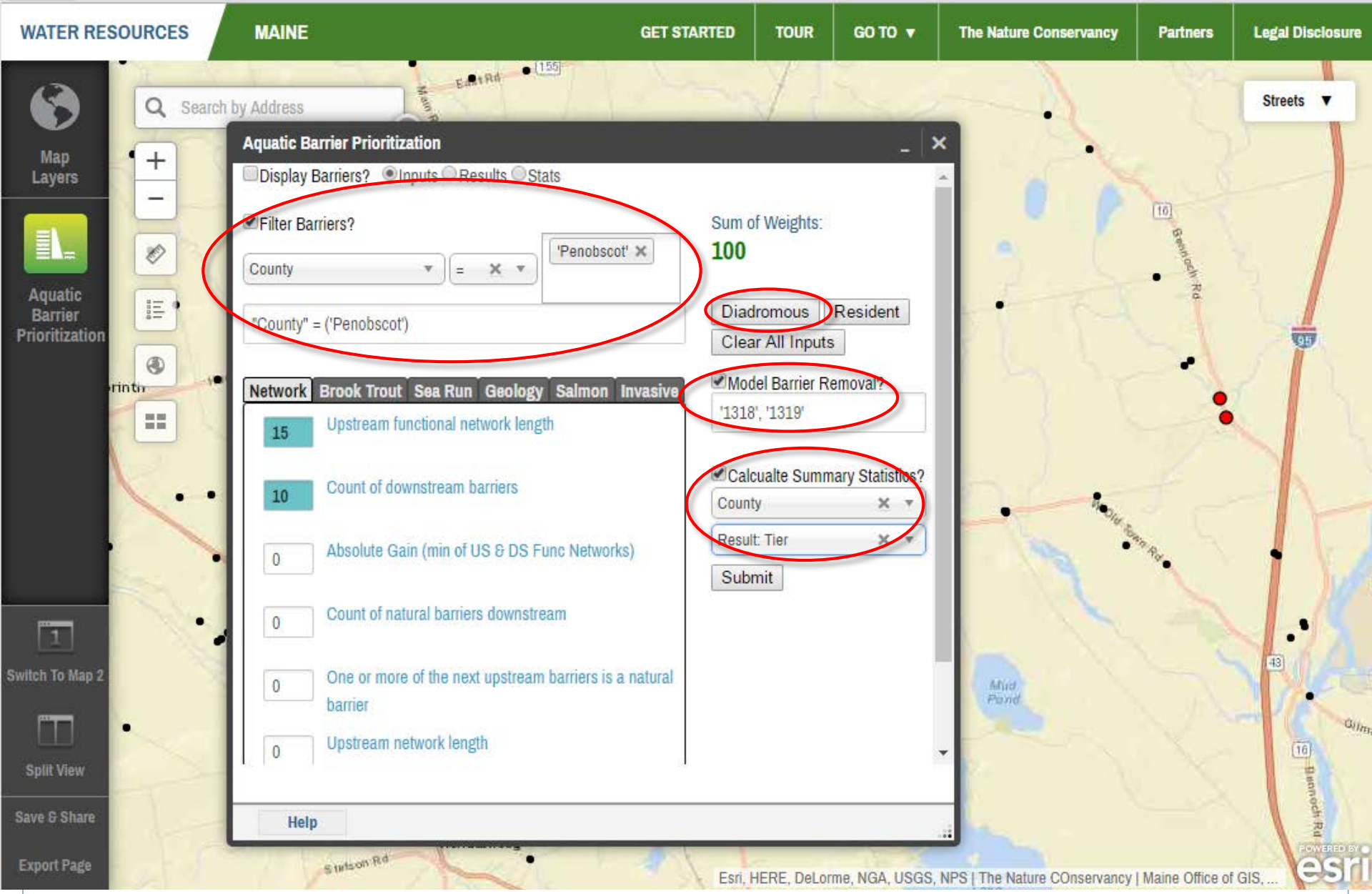


Simple Analysis: Upstream Network Length



US Network Result

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Split View
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Display Barriers?
Inputs
Results
Stats
Filter Barriers?
County
=
'Penobscot'
"County" = ('Penobscot')
Sum of Weights:
100
Diadromous
Resident
Clear All Inputs
Model Barrier Removal?
'1318', '1319'
Calcualte Summary Statistics?
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Result: Tier
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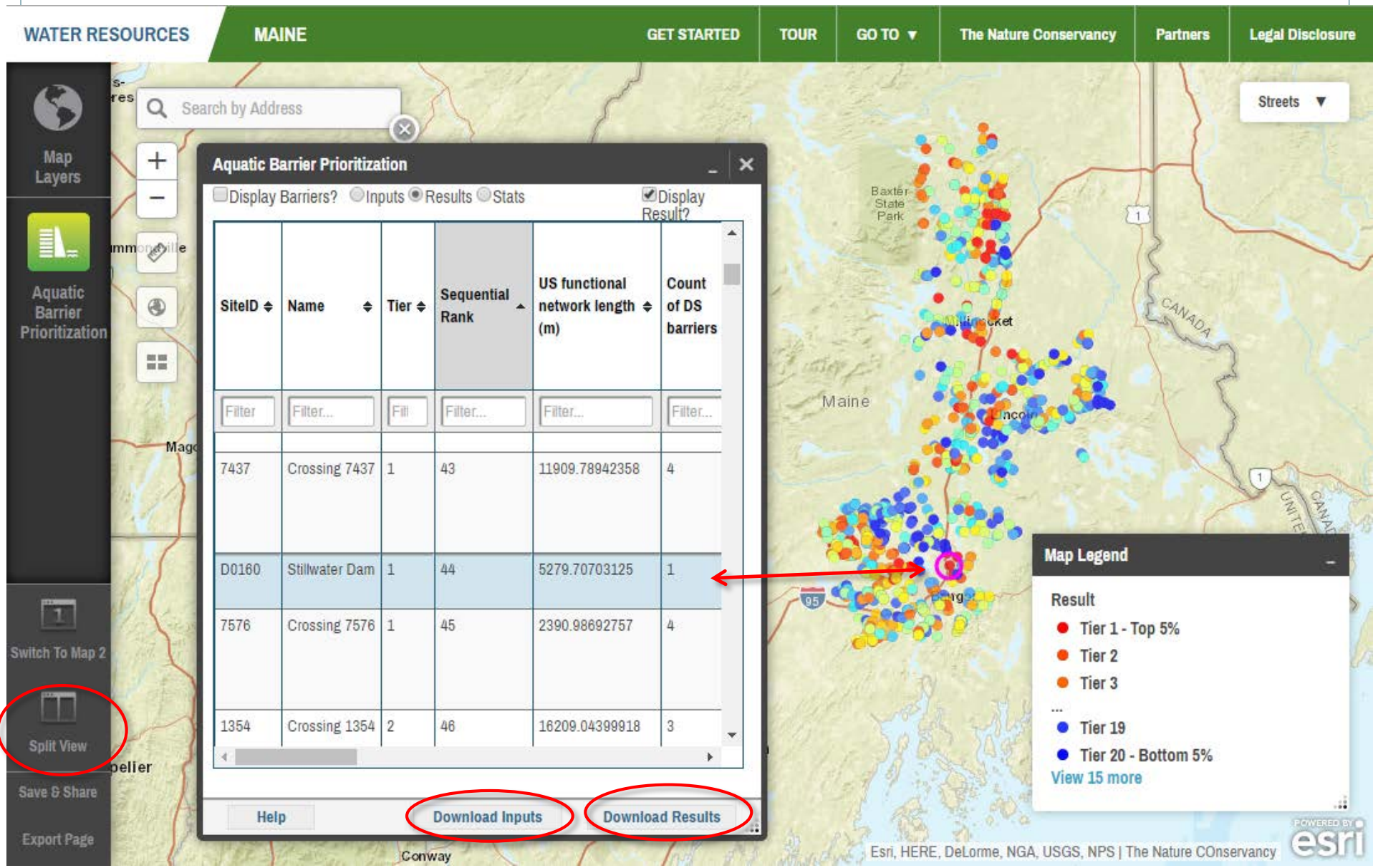
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Display Result?
SiteID
Name
Tier
Sequential Rank
US functional network length (m)
Count of DS barriers
7437 Crossing 7437 1 43 11909.78942358 4
D0160 Stillwater Dam 1 44 5279.70703125 1
7576 Crossing 7576 1 45 2390.98692757 4
1354 Crossing 1354 2 46 16209.04399918 3
Help
Download Inputs
Download Results
Map Legend
Result
Tier 1 - Top 5%
Tier 2
Tier 3
...
Tier 19
Tier 20 - Bottom 5%
View 15 more
Maine
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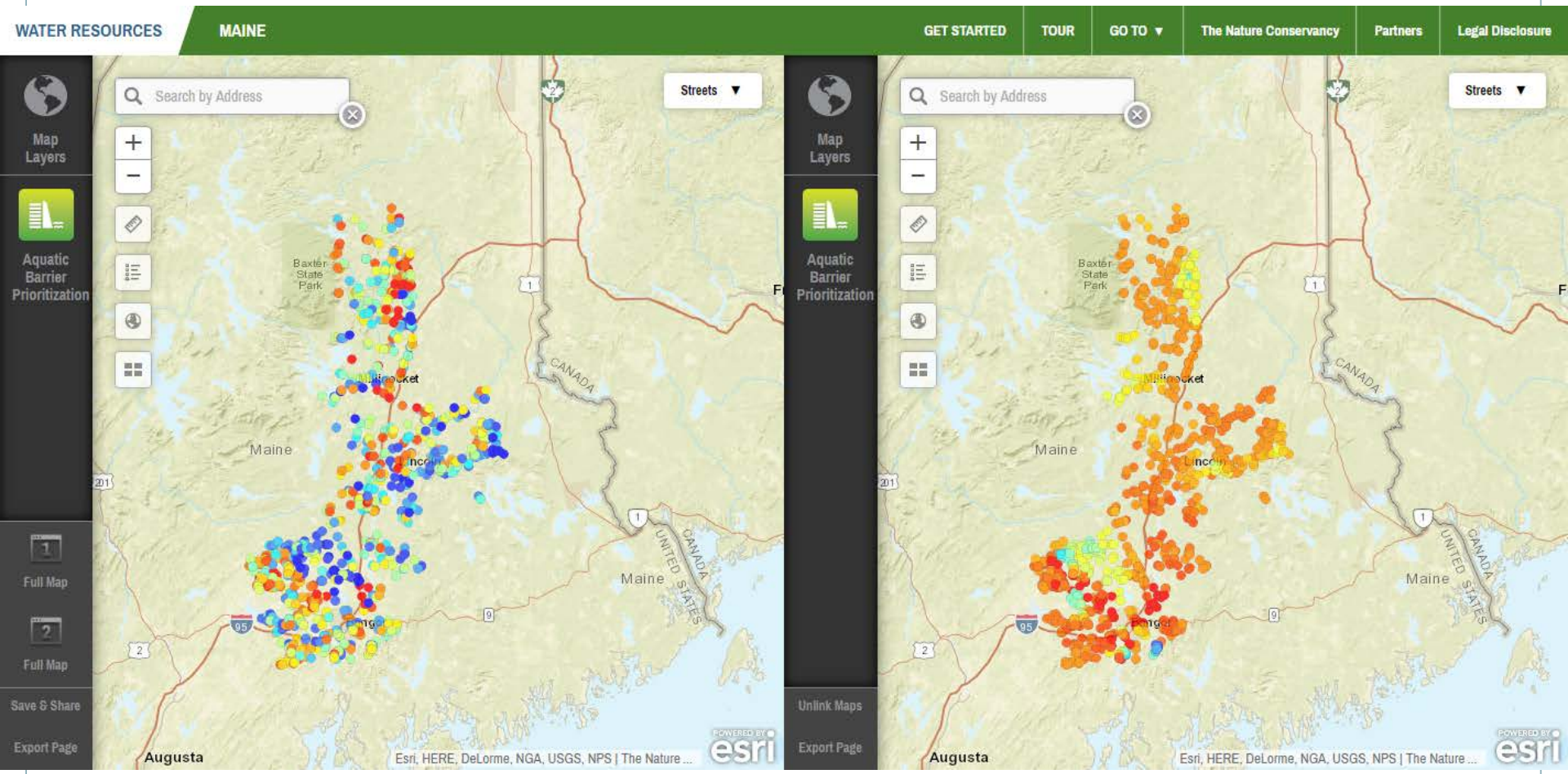
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Full Map
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Esri, HERE, DeLorme, NGA, USGS, NPS | The Nature ...
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Outcomes

- Reactive
  - If an opportunity arises, is it an ecologically worthwhile investment?

Flickr creative commons user: Travis Nep Smith

- Proactive
  - Identify a suite of barriers where investment in removals is ecologically valuable & act on them

Flickr creative commons user: javajones

Caution: these results…

- Are **not** a hit list of dams
- Are **not** a replacement for site-specific knowledge and field work
- Do **not** incorporate any social, economic, or feasibility factors
- Do **not** incorporate every possible aspect of potential ecological benefit

- **Are** a screening-level tool
- Use the **best available** data
- **Help** inform on-the-ground decision making

Questions?

Thanks!

http://maps.coastalresilience.org/maine/

emartin@tnc.org